

## WHAT IS CLAIMED IS:

1. An optical apparatus for measuring the velocity of flowing biomaterials, comprising:

a coherent light source for projecting a light beam with low coherent  
5 length;

a reference member having mirrors for periodically reflecting lights thereon;

a photo detector for receiving photo signals;

a splitter for splitting said light beam from said coherent light source  
10 into a reference beam and a detecting beam;

wherein said splitter is located between said photo detector and said reference member, said reference beam from said splitter projects on said reference member and reflects back to said photo detector by the reflection of said splitter; said detecting beam from said splitter projects on said  
15 biomaterials and reflects back to said photo detector by the reflection of said splitter; and at least one location of said reference member relative to said splitter is applied as the velocity of said biomaterials flow is measured.

2. The apparatus as claimed in claim 1, wherein said reference  
20 member comprises at least a gear for mounting said mirrors; and a motor for driving said gears to rotate for periodically reflecting said reference light to said splitter.

3. The apparatus as claimed in claim 2, wherein said mirrors is mount on the teeth of said gear for reflect said reference light back to said

splitter.

4. The apparatus as claimed in claim 3, wherein said mirror are reflecting layers formed on said teeth of said gear through deposition or through coating.

5 5. The apparatus as claimed in claim 2, wherein said rotation speed of said motor depends on a voltage input to said motor.

6. The apparatus as claimed in claim 1, further comprising a movable platform on which said reference member is mount for changing the positions of said reference members.

10 7. The apparatus as claimed in claim 1, further comprising a polarizer located between said coherent light source and said splitter.

8. The apparatus as claimed in claim 1, further comprising an auxiliary mask having a slit, wherein said auxiliary mask is located between said splitter and said photo detector.

15 9. The apparatus as claimed in claim 1, wherein said photo detector is a charge-coupled- device (CCD).

10. The apparatus as claimed in claim 8, wherein said lights reflected on said photo detector form a pattern of stripes, and the width of said slit is less than a distance between any two adjacent stripes.

20 11. The apparatus as claimed in claim 1, wherein said biomaterials are bloods in vessels.

12. The apparatus as claimed in claim 1, wherein one fixed location of said reference member relative to said splitter is applied as the relative velocity of said biomaterials flow is measured.

13. The apparatus as claimed in claim 1, wherein said low coherent length of said light beam from said coherent light source is less than 100  $\mu\text{m}$ .

14. The apparatus as claimed in claim 1, wherein said coherent  
5 light source is an ultrafast laser, a super luminescent diode (SLD), an edge emitting diode laser, an Er-doped super luminescence optical fiber, and a Tm-doped super luminescence optical fiber.

15. The apparatus as claimed in claim 1, wherein the wavelength  
of said coherent light source is located in the wavelength region of visible  
10 light or of near-infrared radiation.